Volume 2, Issue 35 ■ 31AUG2012

S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Video shows the traffic inside a brain cell: New imaging technique reveals the brain's continuous renovation

Science Daily, 24AUG2012

Using bioluminescent proteins from a jellyfish, a team of scientists has lit up the inside of a neuron-capturing spectacular video footage that shows the movement of proteins throughout the cell. The video offers a rare peek at how proteins, the brain's building blocks, are directed through neurons to renew its structure.

VIDEO, TECHNICAL ARTICLE

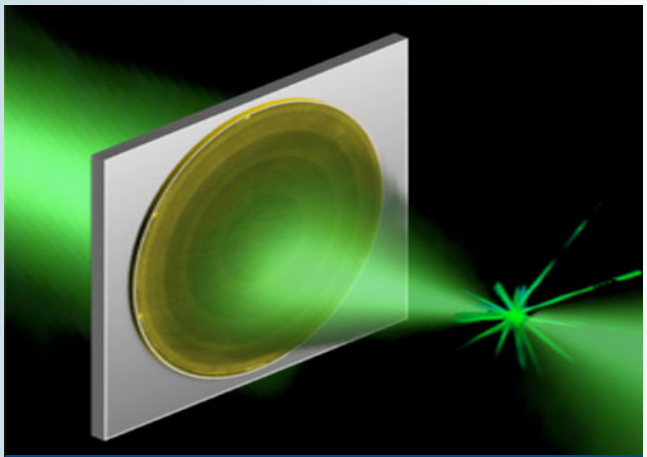
Tags: Neuroscience, Featured Article

Flat lens offers a perfect image

Harvard University, 23AUG2012

Researchers at Harvard have created a 60 nanometers thick flat lens which is essentially two-dimensional, yet its focusing power approaches the ultimate physical limit set by the laws of diffraction. Operating at telecom wavelengths the new device is completely scalable, from near-infrared to terahertz wavelengths, and simple to manufacture. TECHNICAL ARTICLE

Tags: Imaging technology, Featured Article



A new ultrathin, flat lens focuses light without imparting the optical distortions of conventional lenses. (Artist's rendition courtesy of Francesco Aieta.)

S&T NEWS ARTICLES

ADVANCED MATERIALS

Nanotechnology breakthrough—A new use for atomically engineered gold

Nanowerk, 29AUG2012

Researchers at the University of Central Florida found that nanoclusters developed by adding atoms in a sequential manner could provide interesting optical properties. It turns out that the gold nanoclusters exhibit qualities that may make them suitable for creating surfaces that would diffuse laser beams of high energy which could help keep pilots and sensitive equipment safe from destructive lasers. TECHNICAL ARTICLE

Tags: Advanced materials

New wave of technologies possible after ground-breaking analysis tool for nanometer devices developed

Science Daily, 28AUG2012

Researchers in the UK have developed a new important tool for microscopy analysis of nanostructures. In the very tiny quantities of matter used in nanostructures the behaviour of electrons and photons is governed by new quantum effects, quite different from what happens in bulk materials. This makes them attractive for various new technologies.

Tags: Advanced materials, S&T UK

A decade in numbers

Nature Materials, 25AUG2012

On the tenth anniversary of the launch of Nature Materials we look back at how authors, reviewers, and editors have contributed to the journal by evaluating data such as decision types and times, and the geographical share of submitted and published manuscripts.

Tags: Advanced materials, Bibliometrics

EPNanoNet Summit: Nanotechnology developments across the exploration & production industry

Nanowerk, 25AUG2012

To encourage industry engagement and promote nano and E&P cross sector opportunities, the pioneering EPNanoNet

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network, through a joint collaboration with The Rice Alliance for Technology and Entrepreneurship, will host a Summit in Houston on September 12th delving deeper into significant nanotechnology developments.

Tags: Advanced materials

How to Manipulate Nanoparticles with Lasers

American Physical Society, 25AUG2012

Japanese researchers calculate the complex interactions between laser beams and nanoparticles and find that the resulting forces are stronger than had been expected, and can be controlled in novel ways. These forces should allow much broader use of laser manipulation for applications such as nanoparticle sorting. TECHNICAL ARTICLE

Tags: Advanced materials

Next-Generation Display Technologies

IEEE Spectrum, 25AUG2012

Instead of silicon in the backplane, engineers are turning to a metal oxide composed of indium, gallium, and zinc in equal parts, giving the material its name: IGZO, for indium gallium zinc oxide. Its electrical properties are roughly between those of amorphous silicon and polysilicon, and IGZO is compatible with existing LCD manufacturing technology. In addition to providing higher resolutions without an expensive polysilicon backplane, the metal oxide is more energy efficient than amorphous silicon.

Tags: Advanced materials, Information technology

Novel technique to synthesize nanocrystals that harvest solar energy

Nanowerk, 25AUG2012

Materials that harvest solar radiation for energy often overheat or degrade over time; this reduces their viability to compete with other renewable energy sources like wind or hydroelectric generators. A new video protocol addresses these issues by presenting a synthesis of two inorganic nanocrystals, each of which is more durable than their organic counterparts.

Tags: Advanced materials, Energy, Solar energy

One-molecule-thick material has big advantages

MIT News, 23AUG2012

The latest "new" material, molybdenum disulfide (MoS2) —which has actually been used for decades, but not in its 2-D form was first described just a year ago by researchers in Switzerland. But in that year, researchers at MIT have already succeeded in making a variety of electronic components from MoS2. They say the material could help usher in radically new products, from whole walls that glow to clothing with embedded electronics to glasses with built-in display screens. TECHNICAL ARTICLE

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Pneumatic Babies, More ZenRobotics Epicness, and a Spanking Orchestra

IEEE Spectrum, 24AUG2012

The pneumatic babies are the spanking orchestra are, unfortunately, not in the same video, but they're both worth watching anyway.

Tags: Autonomous systems & robotics

BIG DATA

When Big Data Questions Can't Wait For Data Scientists

Information Week, 25AUG2012

The big problem, the one that's holding up progress on all the other fronts but especially the development of business cases, is that the tools to analyze and manage big data projects are as rare, complicated, and specialized as the high-level statistics and data-integration requirements in a data-scientist's job description.

Tags: Big data

BIOTECHNOLOGY

Merging the biological and the electronic

Harvard University, 27AUG2012

Harvard researchers grow cyborg tissues with embedded nanoelectronics. We can use electrodes to measure activity in cells or tissue, but that damages them. With this technology, for the first time, we can work at the same scale as the unit of biological system without interrupting it. Ultimately, this is about merging tissue with electronics in a way that it becomes difficult to determine where the tissue ends and the electronics begin.

Tags: Biotechnology

BREAKTHROUGH TECHNOLOGY

Controlling superconductors with light

Science Daily, 28AUG2012

By shining light on a thin layer of molecules coating a material, scientists in Israel have been able to control the critical temperature at which the material can act as a superconductor. This method might be used to develop more powerful computing devices able to save data and run continuously without generating heat and wasting energy. TECHNICAL ARTICLE

Tags: Breakthrough technology, Materials science

Weighing molecules one at a time: Physicists create first-ever mechanical device that measures mass of single molecule

Science Daily, 28AUG2012

The device, developed by researchers at Cal Tech, which is only a couple millionths of a meter in size—consists

continued...

"Research is creating new knowledge."
NEIL ARMSTRONG

of a tiny, vibrating bridge-like structure. When a particle or molecule lands on the bridge, its mass changes the oscillating frequency in a way that reveals how much the particle weighs. The researchers say, this will eventually help doctors diagnose diseases, enable biologists to study viruses and probe the molecular machinery of cells, and even allow scientists to better measure nanoparticles and air pollution. TECHNICAL ARTICLE

Tags: Breakthrough technology

Integrated quantum chip may help close quantum metrology triangle

Physics World, 25AUG2012

Researchers in Germany have moved one step closer to closing the "quantum metrology triangle," by fabricating a proof-of-principle circuit that links two quantum electrical devices in series, for the first time. A closed triangle—something scientists have been chasing for more than 20 years—would finally allow standardized units of voltage, current and resistance to be defined solely in terms of fundamental constants of nature.

Tags: Breakthrough technology, Quantum science

CYBER SECURITY

Frankenstein programmers at UT Dallas test a cybersecurity monster

e! Science News, 28AUG2012

UT Dallas computer scientists are trying to stay one step ahead of cyber attackers by creating their own monster. Frankenstein evades this scanning mechanism. It takes code from programs already on a computer and repurposes it, stringing it together to accomplish the malware's malicious task with new instructions. TECHNICAL ARTICLE

Tags: Cyber security

ENERGY

Head of ARPA-E Sketches Course for Energy Research

MIT Technology Review, 28AUG2012

In the months ahead, ARPA-E plans on forming research programs in areas where the private sector isn't already working and there's the potential for a big jump in performance. Program ideas now being discussed include: Fast charging for electric vehicles; Smart and autonomous sensing; Better materials; More dense biofuel crops; Ultra low-cost hydrogen.

Tags: Energy, Government S&T, S&T Policy

Micro- and nanomotors powered by water as the sole fuel source (w/video)

Nanowerk Spotlight, 25AUG2012

Extending the scope of chemically-powered nanomotors to diverse operations and new environments requires the identification of new in situ fuels in connection to new catalytic materials and reactions. Obviously, water is the ideal choice as fuel for the majority of practical nanomachine applications. Researchers at UCSD have demonstrated the first example of a water-driven bubble-propelled micromotor that eliminates the requirement for the common hydrogen peroxide fuel. VIDEO, TECHNICAL ARTICLE

Tags: Energy, Materials science

ENVIRONMENTAL SCIENCE

Geoengineering: Risks and benefits

BBC News, 25AUG2012

While very few scientists advocate deployment of geoengineering now, many believe we ought to be getting on with research now in order to have technologies ready in 10-20 years when they might be needed. The arguments were on display this week in a symposium at Oxford University, which recently set up a multi-disciplinary research programme on the issue.

Tags: Environmental science

Cloud control could tame hurricanes, study shows

Science Daily, 23AUG2012

They are one of the most destructive forces of nature on Earth, but now environmental scientists are working to tame the hurricane. Scientists at the University of Leeds propose using cloud seeding to decrease sea surface temperatures where hurricanes form. Theoretically, the team claims the technique could reduce hurricane intensity by a category. TECHNICAL ARTICLE

Tags: Environmental science

GOVERNMENT S&T

Lifelike, cost-effective robotic hand can disable IEDs

Science Daily, 24AUG2012

The Sandia Laboratory Hand is modular, so different types of fingers can be attached with magnets and quickly plugged into the hand frame. The operator has the flexibility to quickly and easily attach additional fingers or other tools, such as flashlights, screwdrivers or cameras. Modularity also gives the Sandia Hand a unique durability.

continued...

The fingers are designed to fall off should the operator accidentally run the hand into a wall or another object.

Tags: Government S&T, DOE

Featured Resource

ResearchGate

Launched in 2008, it is a professional network for scientists and researchers. Their vision was to create a platform that helps researchers build reputation and accelerate scientific progress, while enabling them to collaborate on a global scale. The network has attracted over 1.9 million researchers and scientists worldwide. Has 45 million abstracts and over 10 million full texts cover a wide range of topics.

INFORMATION TECHNOLOGY

IBM creating pocket-sized Watson in $16 billion sales push

KurzweilAI, 28AUG2012

With Watson, IBM aims to tackle more complex questions than Apple's Siri. The program will be able to understand oncology well enough to advise doctors on diagnosis and prescriptions. One iPad application for Watson—a healthcare program developed with a Columbia University professor—is being used to demonstrate its medical capabilities for prospective IBM customers.

Tags: Information Technology

IBM introduces new powerful mainframe computers

R&D Magazine, 28AUG2012

IBM said its zEnterprise EC12 mainframe server is designed to help clients securely and quickly sift through massive amounts of data, meeting the demands of retail and other clients in the age of "Big Data." Running at 5.5 GHz, IBM said the microprocessor that powers the mainframe is the fastest chip in the world. Processing speed is 25 percent faster than the previous model.

Tags: Information Technology

Stanford researchers discover the 'anternet'

R&D Magazine, 28AUG2012

Stanford University researchers have discovered that a species of harvester ants determine how many foragers to send out of the nest in much the same way that Internet protocols discover how much bandwidth is available for the transfer of data. The researchers are calling it the "anternet." Scientists have just scratched the surface for how ant colony behavior could help us in the design of networked systems.

Tags: Information Technology, Biomimetics

Mathematicians will lead the next consumer tech market disruption

Wired UK, 24AUG2012

The algorithm is king. Algorithms, and the mathematicians who can design and manipulate them, are already playing a central role in all sorts of technology applications—whether it is Google's search engine or Autonomy's data mining tools for enterprises. But now this type of algorithm-led technology development is filtering down from the macro scale of global databases into consumer devices.

Tags: Information Technology, Mathematics

MATERIALS SCIENCE

The Laser Beam as a "3D Painter"

Nanowerk, 27AUG2012

With laser beams, molecules can be fixed at exactly the right position in a three dimensional material. The new method developed at the Vienna University of Technology can be used to grow biological tissue or to create micro sensors. TECHNICAL ARTICLE

Tags: Materials science, Sensors

Future memory: Ferroelectric materials could bring down cost of cloud computing and electronic devices

Science Daily, 25AUG2012

A team of organic chemists at Northwestern University discovered they could create very long crystals with desirable properties using just two small organic molecules that are extremely attracted to each other. The attraction between the two molecules causes them to self assemble into an ordered network—order that is needed for a material to be ferroelectric. The starting compounds are simple and inexpensive, making the lightweight materials scalable for technology applications. TECHNICAL ARTICLE

Tags: Materials science

Molecule reorganizes itself for new functions

Nanowerk, 25AUG2012

A team of researchers from the US, UK, and Australia used a technique known as "self-assembly", which regulates many of the complex and functional components in biological systems like DNA, to prepare a molecular tetrahedron from twenty-two simple building blocks. The building blocks employed were then chemically programmed to spontaneously react together to form the desired molecule. The discovery will lead to better understanding of nature's processes. TECHNICAL ARTICLE

Tags: Materials science

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New era in camouflage makeup: Shielding soldiers from searing heat of bomb blasts

Science Daily, 25AUG2012

A team of researchers at the University of Mississippi have developed a new camouflage makeup which protects the face and hands for up to 15 seconds before its own temperature rises to the point where a first-degree burn might occur. In some tests, the new face paint can protect for up to 60 seconds, which could be important in giving soldiers time to move away from blast-related fires and also for use by civilian firefighters.

Tags: Materials science

Physicists search for hidden magnetic states

Science Daily, 24AUG2012

A team of researchers in the UK is looking for 'hidden magnetic states' in a type of magnet that has been identified as an ideal candidate for data storage. The composition of this magnetic film material is such that it provides sufficient energy barriers to prevent thermally-activated data loss, with the potential to relieve the present limit on the storage density of hard disk drives.

Tags: Materials science

Elusive metal discovered

e! Science News, 23AUG2012

Carnegie scientists are the first to discover the conditions under which nickel oxide can turn into an electricity-conducting metal. Nickel oxide is one of the first compounds to be studied for its electronic properties, but until now scientists have not been able to induce a metallic state. The compound becomes metallic at enormous pressures of 2.4 million times the atmospheric pressure (240 gigapascals). This finding is certainly important in providing a better understanding of advanced electronic materials.

Tags: Materials science

Northwestern scientists create chemical brain

Northwestern University, 22AUG2012

Northwestern University scientists have connected 250 years of organic chemical knowledge into one giant computer network—a chemical Google on steroids. Called Chematica, the network comprises some seven million chemicals connected by a similar number of reactions. A family of algorithms that searches and analyzes the network allows the chemist at his or her computer to easily tap into this vast compendium of chemical knowledge. And the system learns from experience, as more data and algorithms are added to its knowledge base. TECHNICAL ARTICLE

Tags: Materials science

MEDICAL SCIENCES

Microbiologists find new approach to fighting viral illnesses

Science Daily, 24AUG2012

Researchers at UC Irvine found that certain RNA viruses hijack a key DNA repair activity of human cells to produce the genetic material necessary for them to multiply. By understanding how certain viruses use their host cells to replicate, they have identified a new approach to the development of universal treatments for viral illnesses such as meningitis, encephalitis, hepatitis and possibly the common cold. TECHNICAL ARTICLE

Tags: Medical Sciences

S&T POLICY

China aims high from the bottom of the world

Nature News, 29AUG2012

Chinese astronomers last week unveiled an ambitious plan for an observatory at Dome A—the highest point on the Antarctic plateau—at the International Astronomical Union's twenty-eighth general assembly in Beijing. The Kunlun Dark Universe Telescope (KDUST) will be a 2.5-metre survey telescope designed to use optical and near-infrared light to detect Earth-like planets outside our Solar System and to probe dark matter and how the Universe's first stars formed. The Dome A Terahertz Explorer-5 (DATE5) will be a 5-metre telescope that would detect light with longer wavelengths, allowing astronomers to see into the dark clouds of dust and molecules where stars are forming.

Tags: S&T policy, S&T China

Nanotechnology expert group publishes recommendations on the future of industrial innovation

Nanowerk, 28AUG2012

The European Commission's Expert Advisory Group on nanosciences, nanotechnologies, materials and new production technologies published five orientation papers with recommendations on how innovation in the industrial technology sectors could be better supported in the future, for instance, with Horizon 2020.

Tags: S&T policy, S&T EU

SCIENCE WITHOUT BORDERS

Recycled dishes form telescope network

Nature News, 29AUG2012

Africa refits redundant satellite dishes for radio astronomy. The thrifty project aims to boost the skills of the continent's scientists as Africa prepares to host the US$2.1 billion Square Kilometre Array (SKA), set to be the world's most powerful radio telescope when it is completed in the mid-2020s. In May, the SKA project leaders decided that

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Africa, with South Africa at the helm, would split the array with Australia and New Zealand (see Nature 485, 555–556; 2012). The SKA will detect radiation from the early Universe, giving clues to how the first stars and galaxies formed.

Tags: Science without borders, Space technology

Feynman 1984 talk on Tiny Machines on You Tube

Foresight Institute, 28AUG2012

The conceptual history of nanotechnology is usually traced to a classic talk "There's Plenty of Room at the Bottom" that Richard Feynman gave on December 29th 1959. Feynman gave an updated version of that talk on October 25, 1984 during a week-long experiential seminar at the Esalen Institute, Big Sur, California, called "Idiosyncratic Thinking." He called the talk "Tiny Machines." A 1 hour 19 minutes video of Feynman's 1984 talk has surfaced on YouTube.

VIDEO

Tags: Science without borders

The Results are In: Scientists are Workaholics

Wired, 28AUG2012

Researchers know that science is an around-the-clock endeavor. Well, we now have some quantitative data to back this up. American scientists work late at night, but still recognize that weekends are a time of rest (at least a little). Chinese scientists, on the other hand, don't work late at night, but work almost as hard on the weekends as on the weekdays. And Germany is somewhere in between.

Tags: Science without borders

Fall of Communism changed mathematics in US: New study

PhysOrg.com, 27AUG2012

The collapse of the Soviet Union in 1992 brought an influx of Soviet mathematicians to U.S. institutions, and those scholars' differing areas of specialization have changed the way math is studied and taught in this country, according to new research by University of Notre Dame Economist Kirk Doran and a colleague from Harvard.

Tags: Science without borders, Mathematics

SENSORS

Glowing flowers for ultra-trace analysis of TNT down to the sub-zeptomole level

Nanowerk, 27AUG2012

Researchers in India use an ingenious combination of micro- and nanostructures as sensors: gold mesoflowers, flower-shaped gold particles about 4 µm in size, act as supports for silver clusters, tiny clumps of exactly 15 silver atoms embedded in the protein bovine serum albumin. If a drop of a solution containing TNT is applied, it reacts with the amino groups of the bovine serum albumin to make a Meisenheimer complex—a reaction specific to TNT.

TECHNICAL ARTICLE

Tags: Sensors, S&T India ■

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